

CLAIMS

1. An automated manufacture process testing system configurable to be resident upon a computer system disk drive and perform manufacturing test processing once the disk drive is installed and operating within the computer system, said test system comprising:

5 means for monitoring the computer system, including whether any user commands from the computer system are pending or the computer system is in an idle mode;

at least one test processing module configured to perform at least one manufacture test process on the disk, wherein the at least one manufacture test process is performed in a particular manner depending on whether the computer system has issued the user commands or the computer system is in the idle mode; and

means for tracking performance of the at least one manufacture test process such that counters may be stored in memory which indicate which portions of the disk have been processed through use of the at least one manufacture test process.

2. The system of Claim 1 wherein the at least one manufacture test process includes at least one of: flaw mapping, embedded runout compensation (ERC) and final verification.

3. The system of Claim 2 wherein the at least one test processing module is configured to perform the flaw mapping such that a first flaw mapping test may be performed when a user command for operating the disk drive is pending and a second flaw mapping test when the computer system is detected to be in an idle mode.

20 4. The system of Claim 3 wherein the first flaw mapping test is performed by identifying logical block addresses (LBAs) on the disk to which information is to be written, making a determination of whether the identified LBAs have been processed, and if the identified LBAs have not been processed, performing a write/verify on each of the LBAs.

5. The system of Claim 3 wherein the second flaw mapping test is performed by accessing memory and identifying an increment of logical block addresses (LBAs) which are unprocessed, performing a write/verify on each of the LBAs in the increment, updating them memory to indicate which of the LBAs have been processed.

5 6. The system of Claim 2 wherein the at least one manufacture test processing module is configured to perform the ERC such that during a detected idle condition for the computer system, memory may be accessed to determine which cylinder was last processed, performing the ERC on the next cylinder, and updating memory to indicate completion of the ERC on the next cylinder.

7. The system of Claim 2 wherein the at least one test processing module is configured to perform the final verification such that a first final verification test may be performed when a user command for operating the disk drive is pending and a second final verification test when the computer is system is detected to be in an idle mode.

8. The system of Claim 7 wherein the first final verification test is performed by identifying logical block addresses (LBAs) on the disk to which information is to be written, making a determination of whether the identified LBAs have been processed, and if the identified LBAs have not been processed, performing a write/verify on each of the LBAs.

9. The system of Claim 3 wherein the second final verification test is performed by accessing memory and identifying an increment of logical block addresses (LBAs) which are 20 unprocessed, performing a write/verify on each of the LBAs in the increment, updating the memory to indicate which of the LBAs have been processed.

10. The system of Claim 1 wherein the disk of the disk drive is configured such that a predetermined portion of the disk is processed before installation of the disk drive in a computer

system, and the portions of the disk drive which have been processed are identified in the means for tracking performance.

11. The system of Claim 10 wherein the predetermined portion of the disk is configured such that any major flaws which may be in the disk are detected before the disk
5 drive is installed in the computer system.

12. The system of Claim 10 wherein the disk comprises a plurality of concentric tracks and the predetermined portion includes a predetermined percentage of the plurality of tracks as well as every Nth of the plurality of tracks.

13. A method of performing manufacturing test processing for a computer system disk drive comprising:

installing the disk drive in a computer system and employing the disk drive for operations of the computer system;

5 detecting a predetermined condition in the operations of the computer system;

based on the detected condition, initiating and performing at least one manufacture process test of a particular area of the disk of the disk drive, wherein the test is performed in accordance with information stored in memory which indicates where the at least one manufacture test process shall begin and end;

10 performing corrective processes portions of the disk for which errors are detected; and

15 updating the memory to indicate upon which portions of the disk the manufacture test processes have been performed.

14. The method of Claim 13 wherein the at least one manufacture test process includes at least one of: flaw mapping, embedded runout compensation (ERC), and final verification.

15. The method of Claim 14 wherein the detected condition comprises a user command pending from the computer system and the computer system in an idle mode.

16. The method of Claim 15 wherein the flaw mapping comprises the steps of:

determining the detected condition for the computer system;

20 if the user command is pending, before performing the user command, performing the following steps:

identifying logical block addresses (LBAs) for will be employed as part of performing the user command;

accessing memory to determine if the identified logical block addresses have been previously processed,

if any of the LBAs are unprocessed, performing a write/verify on each of the unprocessed LBAs and reassigning any of the unprocessed LBAs which fail the write/verify; and

5 updating the memory to indicate which of the unprocessed LBAs have been processed;

if the computer system is in idle mode performing the following steps:

accessing the memory and identifying a next increment of LBAs to process;
performing the write/verify on each of the LBAs in the increment;
reassigning the LBAs in the increment which fail the write/verify; and
updating the memory to indicate that the LBAs in the increment have been

processed.

17. The method of Claim 13 wherein performance of the ERC comprises the steps of: determining the detected condition for the computer system; and
if the computer system is in the idle mode, performing the following steps:

accessing the memory and identifying a next cylinder to process;
performing the ERC on the next cylinder, and storing in memory any generated error values; and

20 updating the memory to indicate that the next cylinder has been processed.

18. The method of Claim 15 wherein the final verification comprises the steps of: determining the detected condition for the computer system;

if the user command is pending, before performing the user command, performing the following steps:

identifying logical block addresses (LBAs) for will be employed as part of
forming the user command;

5 accessing memory to determine if the identified logical block addresses have been
previously processed,

if any of the LBAs are unprocessed, performing a write/verify on each of the unprocessed LBAs and reassigning any of the unprocessed LBAs which fail the write/verify; and

updating the memory to indicate which of the unprocessed LBAs have been processed;

if the computer system is in idle mode performing the following steps:

accessing the memory and identifying a next increment of LBAs to process; performing the read/verify on each of the LBAs in the increment; reassigned the LBAs in the increment which fail the read/verify; and updating the memory to indicate that the LBAs in the increment have been

19. The method of Claim 13 further comprising the step of performing at least a portion of the manufacture test processes prior to installation of the disk drive in the computer system in order to identify any major flaw which may exist on the disk.

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20. The method of Claim 13 wherein a program for performing the at least one manufacturing test process is placed in memory on the disk drive before the step of installing the disk drive in the computer system.

21. The method of Claim 19 wherein the disk drive includes a plurality of concentric tracks and the step of performing at least a portion of the manufacture test process prior to installation may comprise testing a predetermined percentage of the plurality of tracks on the disk as well as every Nth track of the plurality of tracks.

22. A computer memory disk drive installable in a computer system, said disk drive comprising:

at least one electromagnetic storage disk with a plurality of radially spaced tracks for storing information;

5 at least one head configured to read/write information on the electromagnetic storage disk;

at least one processing module stored in memory which is accessible to perform manufacturing test processing of the electromagnetic storage disk while the disk is installed and operating in the computer system; and

10 a controller in connection with the head which is configured to execute the at least one manufacture test process upon detection of predetermined conditions of the computer system configured to control operation of the head which is further configured to include detection means which may detect when the computing device is idle, such that the processing module may be activated and the manufacturing test processing performed.

15 23. The disk drive of Claim 22 wherein the at least one processing module is storable in read only memory (ROM).

24. The disk drive of Claim 22 wherein the at least one processing module is storable on a processed area of the at least one electromagnetic storage disk.

25. The system of Claim 22 wherein the at least one manufacture test process 20 includes: flaw mapping, embedded runout compensation (ERC) and final verification.

26. The system of Claim 25 wherein the at least one test processing module is configured to perform the flaw mapping such that a first flaw mapping test may be performed

when a user command for operating the disk drive is pending and a second flaw mapping test when the computer is system is detected to be in an idle mode.

27. The system of Claim 26 wherein the first flaw mapping test is performed by identifying logical block addresses (LBAs) on the disk to which information is to be written, 5 making a determination of whether the identified LBAs have been processed, and if the identified LBAs have not been processed, performing a write/verify on each of the LBAs.

28. The system of Claim 26 wherein the second flaw mapping test is performed by accessing memory and identifying an increment of logical block addresses (LBAs) which are unprocessed, performing a write/verify on each of the LBAs in the increment, updating them memory to indicate which of the LBAs have been processed.

29. The system of Claim 25 wherein the at least one manufacture test processing module is configured to perform the ERC such that during a detected idle condition for the computer system, memory may be accessed to determine which cylinder was last processed, performing the ERC on the next cylinder, and updating memory to indicate completion of the ERC on the next cylinder.

30. The system of Claim 25 wherein the at least one test processing module is configured to perform the final verification such that a first final verification test may be performed when a user command for operating the disk drive is pending and a second final verification test when the computer is system is detected to be in an idle mode.

20 31. The system of Claim 30 wherein the first final verification test is performed by identifying logical block addresses (LBAs) on the disk to which information is to be written, making a determination of whether the identified LBAs have been processed, and if the identified LBAs have not been processed, performing a write/verify on each of the LBAs.

32. The system of Claim 30 wherein the second final verification test is performed by accessing memory and identifying an increment of logical block addresses (LBAs) which are unprocessed, performing a write/verify on each of the LBAs in the increment, updating them in memory to indicate which of the LBAs have been processed.

5 33. The system of Claim 22 wherein the storage disk is configured such that the manufacture test processing is performed on a predetermined portion of the disk before installation of the disk drive in a computer system.

34. The system of Claim 33 wherein the predetermined portion of the storage disk is configured such that any major flaws which may be in the disk are detected before the disk drive is installed in the computer system.

35. The system of Claim 33 wherein the predetermined portion includes a predetermined percentage of the plurality of radially spaced tracks as well as every Nth of the plurality of radially spaced tracks.